

UNPUBLISHED PRELIMINARY DATA

QUARTERLY PROGRESS REPORT

For Period Ending 31 Dec. 1964

3P
Code - None
NOL-764/NASA RI20 MAGNETOMETRY PROGRAM

N.O.L.

HIGHLIGHTS

N65-82321

1. Superconducting Shielding

The large dewar system for use with the Vickers Dycome unit was received in December.

A medium scale version of the shield system providing a small room temperature access region has been constructed to aid in evaluating operation procedures on the large scale unit. Measurements with this system will not be definitive as to shielding or pumping factors, however, as we have been unable to obtain a fluxgate magnetometer small enough to fit our access port and thus we will be forced to use a Hall probe.

2. Magnetometer-Evaluation System

The Vickers DYCOME dynamically controlled Helmholtz coil system was delivered on 4 December, and arrangements were made for installation and checkout by Vickers to begin on 4 January.

Negotiations are continuing between the NOL Supply Department and potential suppliers of a remote temperature conditioning system for use with the above space-magnetic-field simulator.

The following auxiliary instrumentation was delivered: a dual-channel recorder (Sanborn 320), an automatic current controller (Guildline 9770), and a nanovoltmeter (Astrodata 121).

3. Sensor-Core Research

Theoretical and experimental analysis of the geometrical and material property parameters affecting the sensitivity of closed-core second-harmonic flux-gate magnetometers continued. An important factor, emerging from this analysis, is the importance of keeping the d-c intrinsic initial

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permeability (μ_0) low in order to minimize attenuation of the d-c input magnetic signal to be measured. This is not to be confused with the maximum a-c permeability (μ_A) which should be high for sensitive magnetometer action. Unless input attenuation is kept low by low μ_0 , the gain in magnetometer sensitivity due to high μ_A , can be completely obscured. The detailed results are given in a paper to be presented at the 1965 International Conference on Nonlinear Magnetics.¹

Experimental efforts to pursue the residual noise problem more thoroughly have been hampered by the continued absence of an Ames driver/detector electronics package, the delivery of which was first promised by Ames approximately eight months ago.

4. Misc. Assistance to Ames and Honeywell

At the request of Mr. Kerwin, a strip of NITINOL was sent to Ames for preliminary experiments in applying the unique heat-sensitive deformation properties of this material for a sensor-flipping mechanism.

In connection with NASA Control #2-2070 with Honeywell/Boston, the following cores were wound and heat treated using elongated, rectangular, ceramic bobbins supplied by Honeywell:

<u>NOL No.</u>	<u>Honeywell No.</u>	<u>Tape Dimensions</u>	<u>Material</u>	<u>Annual Temp.</u>
3804	260	1/16"x1/2 milx3 wraps	Arnold	1100°C
3805	261	same	Arnold	1000°C
3806	262	same	Arnold	900°C
3807	263	same	Arnold	800°C

PLANS FOR NEXT PERIOD

1. Superconducting Shielding

The medium scale version of the superconducting shield will be placed in operation and measurements will be made of the field attenuation attainable within the limitations of the available sensors.

2. Space-Magnetometer-Evaluation System

Installation and checkout of the DYCOME unit will be completed, and room temperature measurements of the performance of some space magnetometers will be started. Negotiations will continue and hopefully will be completed for obtaining a suitable remote temperature-conditioning system.

3. Sensor-Core Research

Factors affecting zero-signal output voltage of closed-core magnetometers will be studied analytically and experimentally, using the best available driver-detector electronics.

REFERENCE

1. "Factors Affecting the Sensitivity of Gamma-Level Ring-Core Magnetometers", D. I. Gordon, R. H. Lundsten, R. A. Chiarodo. Paper to be presented at the 1965 International Conference on Nonlinear Magnetism (INTERMAG), Washington, D. C., 21-23 April 1965.